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| **Mekelle University**  **Ethiopian Institute of Technology - Mekelle**  **School of Mechanical and Industrial Engineering**  **Industrial Engineering program** | | | | |
| Course Number (code) | IEng 3112 |  | ECTS Credits | 3 |
| Course Title | Statistical Quality Control | Contact Hours | 5 (3 lecture + 2 tutorial) |
| Degree Program | B.Sc. in Industrial Engineering | Pre-requisites | Statistics for Engineers |
| Class Year | 3rd year 1st semester | Status of Course | Compulsory |
| Lecturer | Xxxxx xxxxx | Attendance Req. | Lec. 80% and Tut. 100% |

**Course Objectives & Competences to be acquired**

After taking the course, students will be able to:

* Understand concepts regarding Quality and Quality improvement
* Apply statistical thinking to quality improvement
* Use statistical tools to monitor and investigate a wide variety of processes
* Select, develop and analyze appropriate control charts for different applications
* Interpret variability in work processes
* Quantify process capability through data analysis and control charts

**Course Description/Course Contents**

This course presents current information and methods associated with achieving statistical quality control of processes. The Course content includes the practical, procedural, and theoretical information which is essential to the engineer in designing and establishing SPC systems.

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| **Week** | **Day 1 Activity**  **(chapters, assessments, delivery)** | **Day 2 Activity**  **(chapters, assessments, delivery)** |
| 1 | * General Introduction * Course Plan distribution | 1. **Introduction**     * The meaning of Quality and Quality improvement    * Dimensions of Quality    * Quality philosophies and Approaches to Continuous Improvement    * The link between Quality and Productivity    * Quality costs  * *Mode of delivery: Lecture* |
| 2 | 1. **Statistical Quality Control Tools**    1. Statistical Thinking    2. Process variability    3. Key Process Monitoring and Investigating Tools       1. Pareto charts       2. Cause and effect diagrams   *Mode of delivery: Lecture* | ….Continued from chapter 2   * + 1. Histograms     2. Scatter diagrams     3. Check sheets     4. Flow charts     5. Control charts * *Mode of delivery: Lecture* |
| 3 | Tutorial on chapter 2  (examples, class works)   * *Mode of delivery: tutorial* * *Remedial support: Individual consultation* | * *First Quiz on chapters 1 and 2* * *Individual assignment on problem solving tools* |
| 4 | 1. **Statistical Process Control**     1. Control Charts for Variables (Part I)       1. Types of Control Charts for Variables       2. Constructing Variable Control Charts   *Mode of delivery: Lecture* | ….Continued from chapter 3 part I   * + 1. Interpreting Patterns of Charts and evaluating the state of control   *Mode of delivery: Lecture* |
| 5 | ….Continued from chapter 3 part I   * Examples and Exercises on Control Charts for Variables   *Mode of delivery: Tutorial* | * 1. Control Charts for Attributes (Part II)      1. Types of Control Charts for Attributes      2. Constructing Attribute Control Charts   *Mode of delivery: Lecture* |
| 6 | ….Continued from chapter 3 part II   * + 1. Interpreting Patterns of Charts and evaluating the state of control   *Mode of delivery: Lecture* | ….Continued from chapter 3 part II   * Examples and Exercises on Control Charts for Attributes   *Mode of delivery: Tutorial* |
| 7 | * *Second Quiz on chapter 3* * *Project work on application of quality control tools*   *(the project work takes 6 weeks and need to be done on selected case companies by network groups)* | Feedback for Quizzes 1 and 2   * *Mode of delivery: tutorial* * *Remedial support: Individual consultation* |
| 8 | 1. **Process Capability**    1. The Concept of Process Capability       1. Variation and Specifications       2. Capability and Control   *Mode of delivery: Lecture* | ….Continued from chapter 4   * 1. Measuring Process Capability   2. Process Capability Indices   3. Interpreting Capability Indices   *Mode of delivery: Lecture* |
| 9 | ….Continued from chapter 4   * Examples and Exercises on process capability   *Mode of delivery: Tutorial* | * *Third Quiz on chapter 4* * *Assignment on process capability* |
| 10 | 1. **Acceptance Sampling**    1. Introduction to Lot Acceptance Sampling plans    2. Types of Lot Acceptance Sampling plans    3. Designing Lot Acceptance Sampling plans   *Mode of delivery: Lecture* | ….Continued from chapter 4   * 1. Evaluating Lot Acceptance Sampling plans      1. Operating characteristics (OC) Curves      2. Acceptable Quality Level (AQL)      3. Lot Tolerance Percent Defective (LTPD)      4. Average Outgoing Quality (AOQ)   *Mode of delivery: Lecture* |
| 11 | Examples and Exercises on Acceptance Sampling  *Mode of delivery: Tutorial* | * *Fourth Quiz on chapter 5* |
| 12 | Progress report of project work | Feedback for Quizzes 3 and 4   * *Mode of delivery: tutorial*   *Remedial support: Individual consultation* |
| 13 | Final project report | Final Project presentation |
| 14 | Revision Week |  |
| 15 | Study Week |  |
| 16 | Final Exam week |  |

**Evaluation**

Quizzes and Tests………………………………………………………………………….25%

Assignment…………………………………………………………………………….…..10%

Project work………………………………………………………………………………..15%

Final Exam………………………………………………………………………………....50%

**References**

1. Douglas C. Montgomery, Introduction to Statistical Quality Control, Sixth Edition.
2. Amitava Mitra, Fundamentals of Quality Control and Improvement, 2nd Edition, Pearson Education
3. John S. Oakland, Statistical Process Control, Fifth Edition.
4. Evans. Lindsay (2003). The Management and Control of Quality, 3rd Edition.